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OF PLANT PROTECTION

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DISCOVERIES AND CURRENT EVENTS *

Argentine Republic: The Overwintering Stages of Pear and Apple Scab (1).

In 1934 the existance has been determined, for the first time in the Argentine Republic, of the perithecia of *Venturia pirina* Aderk. and *V. inaequalis* (Cke.) Winter, agents of the diseases commonly called ' sarnas ' (scab) of pears and apples, and which have, for a long time, been firmly established in the humid parts of this country, chiefly in the islands of the Delta of the Paraná and various localities in the north west and south of the province of Buenos Aires.

In 1930 pear and apple scab made its presence evident by the damage it caused to the leaves, twigs and especially the fruits much of which became valueless, but it is chiefly in the last few years, with the increase in cultivation of pomaceous fruits, that these diseases have reached dangerous proportions.

In 1931 the Phytopathological Division of the Ministry of Agriculture was able to establish an intense attack of scab on the pear blossom in the first section of the islands of the Delta of the Paraná and which caused the loss of the greater part of the harvest of ' William ' pears, which variety is most cultivated in that region.

It was thus discovered that the epidemic was favoured by the atmospheric conditions which preceeded the appearance of the disease (a relative humidity was determined of 95 to 100 between 25 September and 3 October). On account of these exceptional conditions of humidity apple scab also appeared in abundance in the varieties ' Reinette ' and ' Delicious '. In 1933 pear and apple scab again appeared in epidemic form in various parts of the province of Buenos Aires (San Pedro, Castelli, Cobos, etc.). The first attack took place during the time of blossoming and setting of the fruit (October-November) and the second during the last stage of development (February-March). In both periods the relative humidity was very high and consequently very propitious for the development of the disease.

The propagation of pear and apple scab takes place during the period of vegetation of the trees (September-March) by means of the spring spores (conidia) which was the only form of reproduction then known in the country the overwintering stage (perithecia) of the fungus not having been discovered. It was

* Under this and the third heading the countries are arranged in French alphabetical order.

(1) Communication from the official correspondent of the Institute, Mr. JUAN B. MARCHIONATTO, Agronomical Engineer, Chief of the ' Defensa Agrícola y Sanidad Vegetal ', Ministry of Agriculture, Buenos Aires.

supposed, as in other countries where these diseases exist that the parasites overwintered within the parts attacked (twigs, leaves, fruits) and that the conidia and stromas were the sources of origin of the first infections which were observed on the trees in the spring.

The work of the Phytopathological Division has made it evident that on the fallen leaves attacked by scab after some months (observation July-August) the spring spores (conidia) were rare; on the other hand, on the same leaves the production of perithecia was very abundant. These perithecia are imbeded in the leaf and only a small neck appears on the surface from which the ascospores emerge when they are mature.

V. pirina was especially abundant on the under surface of the leaves of the pear while *V. inaequalis* was faintly discernable on both sides of the leaves of the apple.

The material which was studied came from Castelli (F. C. S.) and Villa Ortúzar (Federal Capital).

Australia: Notes on Plant Diseases Recorded in New South Wales for the Year Ending 30th June, 1934 (1).

Cereals and field crops.

Wheat: Take-all (*Ophiobolus graminis*) and Foot-Rot (*Helminthosporium sativum*) were the most prevalent diseases, and damage up to 50 % was recorded in some crops. Root-Rot (*Fusarium culmorum*) was present to a minor extent. Purple Patch (*Rhizoctonia solani*) was observed in one district causing losses up to 35 %. Although prevalent in the north west, Stem rust (*Puccinia graminis*) did not seriously affect the main crops. Natural infections (aecidia) were observed for the first time in Australia, on the barberry (*Berberis vulgaris*). Losses from Flag Smut (*Urocystis tritici*) were not as severe as in the past owing to cultivation of resistant varieties.

Maize: Root and Stalk Rot was caused mainly by *Gibberella saubinetii*, perithecia were abundant on old stalks. Although the organism was found as a cob and grain rot, *Fusarium moniliforme* was more important in this connection.

F. moniliforme and *F. moniliforme* var. *subglutinans* were important causes of seedling blight. *Gibberella fujikuroi* var. *subglutinans* was recorded as a parasite of maize for the first time.

Millet: Kernel Smut (*Sphacelotheca sorghi*) caused up to 50 % infection in some crops, and root and stalk rots (*Colletotrichum* sp.) were also serious.

Sugar Cane: Less than 1 % of crop was lost by diseases, the most important of which were Gumming (*Bacterium vascularum*) and the viroses, Fiji Disease and Mosaic.

(1) Communication from the official correspondent of the Institute, Dr. R. J. Noble, Biologist, Department of Agriculture, Sydney, New South Wales, Australia.

Lucerne: Stem Nematode (*Anguillulina dipsaci*) affected some crops severely. Witches' Broom (undet.) was also of importance. A wilted and stunted condition apparently associated with unfavourable soil conditions was widespread throughout the State.

Tobacco: Downy Mildew (*Peronospora tabacina*) caused serious loss in seed beds.

Fruit crops.

Apples and Pears: Weather conditions favoured development of Black Spot (*Venturia inaequalis* and *pirina*) where control measures were inadequate or not applied. Other diseases included Bitter Pit, Internal Cork, Water Core, Heart Rot (*Schizophyllum commune*), Brown Rot (*Sclerotinia fructicola*), Pear Fleck (*Entomosporium maculatum*) and Measles.

Citrus: Black Spot (*Phoma citricarpa*) was very severe in coastal areas, Melanose (*Phomopsis citri*) was more widespread than usual. Scab (*Sporotrichum citri*) caused loss in lemons and grape fruit. Leaf Yellowing (possibly magnesium deficiency) was prevalent in portions of the coastal areas.

Stone Fruits: Brown Rot (*Sclerotinia fructicola*) was most destructive and Freckle (*Cladosporium carpophilum*) also assumed serious proportions. Green Rot of Apricots (*Sclerotinia libertiana*) was noted for the first time. Rust (*Puccinia pruni-spinosae*) damaged some canning varieties of peaches in inland irrigation areas. An internal breakdown of apricots which caused almost total disintegration of the fruit tissues was associated with excessively moist soil conditions under irrigation. Root Nematode (*Heterodera marioni*) was very prevalent on peaches in some sandy soils of coastal areas. Internal Brownig (undet.) was recorded on some varieties of canning peach.

Grapes: Downy Mildew (*Plasmopara viticola*) and Black Spot (*Gloeosporium ampelophagum*) developed seriously in most crops.

Miscellaneous Fruits: Diseases affecting Cavendish bananas were of importance only in certain areas and included Anthracnose (*Gloeosporium musarum*) in cooler areas, Dry Rot (*Clitocybe* sp.) in newly cleared lands, Leaf Spot (*Cercospora* sp.) and Bunchy Top (virus). Some serious individual losses were caused by Squirter (*Nigrospora* sp.)

Strawberries were severely affected with Wilt (*Rhizoctonia* sp.).

Vegetable crops.

Beans: Bacterial Blight (*Bacterium medicaginis* var. *phaseolicola*) was again the most serious disease. Mosaic developed extensively after widespread aphis infestation. Lack of pollination was associated with exceptionally cool weather in some districts.

Cabbages and Cauliflowers: Leaf Spot (*Alternaria brassicae*) was of importance and wet weather favoured development of Black Rot (*Bacterium campestre*) and Leaf Spot (*Bacterium maculicolum*).

Potatoes: Many crops failed as result of epidemic of Late Blight (*Phytophthora infestans*). Virus diseases included Leaf Roll, Mosaic and Aucuba Mosaic. Rhizoctonia disease and Common Scab (*Actinomyces scabies*) were also prevalent.

Tomatoes: Late Blight (*Phytophthora infestans*) was the most important disease of field crops. Leaf Mould (*Cladosporium fulvum*) reached epidemic form for the first time. Bacterial Canker (*Aplanobacter michiganense*) although apparently present for several years past was recorded for the first time as causing serious damage. Big Bud (virus) although not yet serious appears to have become more widespread. Spotted Wilt (virus) again seriously affected spring crops. Streak (virus) was recorded for the first time and seriously affected glasshouse crops.

Miscellaneous Vegetables: Blossom Rot of Cucurbits (*Choanephora cucurbitarum*) was recorded for the first time. Downy Mildew (*Peronospora destructor*) again seriously damaged onion crops. Peas were severely affected by Blight (*Bacterium pisi*). Rosette (undet.) was widespread on sweet potato crops and caused some heavy losses.

Miscellaneous plants.

The following diseases were recorded for the first time. Leaf Smut (*Urocystis agropyri*) on *Bromus mollis*, Leaf Stripe (*Ustilago striaeformis*) on *Poa annua*, Powdery Mildew (*Ovulariopsis* sp.) on Mock Orange (*Philadelphus* sp.), Leaf Spot (*Bacterium aptatum*) on Nasturtium (*Tropaeolum* sp.). Brown plaster mould (*Myriococcum praecox*) was recorded for the first time in mushroom beds.

Twig and Leaf Blight (*Marsonia salicicola*) affected Willows (*Salix* sp.) more seriously than in the previous season.

Eritrea: The Tropical Migratory Locust (1).

During the month of October, 1934 the hatching of a few larvae of *Locusta migratoria migratorioides* was reported in the territory of Usoquà and Decdec Nabò, Cohain, Seraè. The larvae were immediately destroyed by the local natives.

(1) Communication from the official correspondent of the Institute, Dr. Rolando Guidotti, Chief of the Agricultural Bureau of Eritrea, transmitted by the Government of the Colony.

Estonia: The Destruction of Barberry and Buckthorn (1).

In Estonia the cereals are often attacked by rusts. It is especially in the North-West of the country that the cereals suffer from this disease which sometimes causes severe damage to the cultivation. In southern Estonia, the damage which the cereals suffer is notably less important. The reason for this is, that in the South the barberry (*Berberis vulgaris* L. and var. *atropurpurea* Hort.) is found solely in parks and gardens and rarely in the wild state, whereas in the North-West, it commonly grows in the wild state on Silurian soil. The buckthorn (*Rhamnus cathartica* L.) is to be found throughout the country, but to a much less extent than the barberry.

In order to control the rusts of cereals (*Puccinia graminis* Pers. and *P. coronifera* Kleb.) Parliament passed a special law at the Assembly of the 18th November, 1932, which renders compulsory the destruction of barberry and buckthorn.

Within a period of three years every bush of barberry and buckthorn must be destroyed by the owners of the land or by the usufructuaries, in the case of lands belonging to the State. During the first year the destruction must be directed against all bushes in gardens, in fields, within a radius of 200 yards round the fields, and in meadows. During the following two years these bushes everywhere else must be destroyed.

The Ministry of Agriculture is authorised to protract the date fixed by the law, if in special cases it appears indispensable. The Ministry may also allow the work of destruction to be suspended in districts where the barberry and the buckthorn offer no danger to agriculture.

The owners and usufructuaries of land are obliged to see that the destroyed bushes do not grow up again.

The cultivation of the above mentioned plants in a district where their destruction is compulsory is allowed only for a scientific purpose, and at the authorisation of the Minister of Agriculture.

Every usufructuary of land is authorised to request that the law in question be put into force, and to apply in this matter to the authority of the police for them to take the necessary steps.

In the case of owners and usufructuaries who do not effect the destruction according to the law, the necessary work will be undertaken by the local authorities at the expense of those interested.

A special instruction with regard to the enforcement of the law will be published by the Minister of Agriculture in agreement with the Minister for Home Affairs.

(1) Communication from the official correspondent of the Institute, Mr. J. Ümarik, Director of the Bureau for Agricultural Education and Experimentation, Ministry of Agriculture, Tallinn, Estonia.

United States of America: The More Important Entomological Records for September, 1934 (1).

Wireworm (*Elateridae*) damage, particularly to potatoes, was reported from Wisconsin, North Dakota, Missouri, and South Carolina.

In general the hessian fly (*Phytophaga destructor* Say) is at a low ebb in the main winter-wheat regions.

Chinch bugs (*Blissus leucopterus* Say) were moving into winter quarters in large numbers throughout the eastern part of their range. An unusual condition is reported in the finding of large populations of these insects in Vermont during the latter part of August.

The corn ear worm (*Heliothis obsoleta* Fab.) was reported as occurring generally from the Gulf region to Minnesota and from the Atlantic to Utah. In Missouri it is said to be more prevalent than at any time during the past 30 years. In Colorado corn-ear infestation was said to be as high as 100 percent. Throughout the greater part of the country the ear worm was doing serious damage.

The fall armyworm (*Laphygma frugiperda* S. & A.) was destructively abundant in the Gulf region from Georgia to Texas.

The codling moth (*Carpocapsa pomonella* L.) was unusually abundant and destructive in the Ohio River Valley and in the Pacific Northwest.

The Mexican bean beetle (*Epilachna corrupta* Muls.) was reported for the first time from Orange and Windsor Counties, Vermont, and from Webster County, Mississippi. Damage has been general and serious throughout its previous range.

The pea moth (*Laspeyresia nigricana* Steph.) has been discovered in the State of Washington, where it occasioned considerable loss in two counties to growers who were raising peas for canning.

The pickle worm (*Diaphania nitidalis* Stoll) again appeared in Connecticut this year. This is its second appearance in the past 34 years.

Heavy damage to sugar beets by the greenhouse leaf tier (*Phlyctaenia rubigalis* Guen.) was reported from Orange County, Calif. The sugar content of the beets in infested fields is so low as to render them hardly worth harvesting.

The satin moth (*Stilpnotia salicis* L.) was reported as occurring in Oregon, in the Willamette Valley. This is the first record of the occurrence of this insect in that State.

One of the elm leaf aphids, *Tuberculatus ulmifolii* Monell, was present in outbreak numbers in Iowa and Nebraska.

Very heavy infestations of crickets (*Gryllus domesticus* L.) in houses located in the vicinity of public dumps were reported from Maine, Massachusetts, and Wisconsin. In the Massachusetts infestation the insects were so numerous as to force the tenants to leave the houses.

(1) Communication from Mr. LEE A. STRONG, Chief of the Bureau of Entomology and Plant Quarantine, United States Department of Agriculture, Washington, D. C., to the International Institute of Agriculture.

Mozambique: Locust Movements (*Nomadacris septemfasciata* and *Locusta migratoria migratorioides*) (1).

Monthly Report (September, 1934).

During the month of September a considerable diminution has been observed in the movements of locusts in the North of the Colony. In the central region a certain movement has already been reported, principally in the district of Quelimane, on the borders of Nyasaland, where large swarms have been seen flying towards the S. One of the largest swarms came from the above-mentioned English Colony.

In the territory of Manica and Sofala large swarms have been observed, generally coming from the N. W.

In the South of the Colony, in the region of Inhambane two swarms have been seen. In the district of Lourenço Marques increasing movements of locusts have been reported.

In the first days of September two swarms crossed the southern frontier coming from Zululand, also another swarm coming from Swaziland. These swarms passed over Maputo, flying towards the confines of Umbeluzi, Tembe, etc. Swarms continued to appear in the valleys of the rivers Incomati, especially in the Mahiça region.

Properties situated in these valleys have been damaged.

Southern Rhodesia: Locust Invasion, 1932-1934 (2).

Monthly Report No. 22. September, 1934.

Swarms of the Red Locust (*Nomadacris septemfasciata*, Serv.) have been in evidence throughout the month, particularly in the eastern and north-eastern districts of the Colony. A feature of the reports received has been the great size and density of some of the swarms observed.

One swarm in the Mazoe district is described as easily the biggest that has ever been seen in the district. It commenced passing over one point in the early morning of the 23rd and at 1 p. m. on the 25th was still passing over.

The direction of flight has been irregular, and no definite migratory tendency has been evidenced, in spite of the fact that a definite invasion via Northern Rhodesia took place in August.

As in previous experience, swarms have continued to haunt the humid eastern border districts crossing the border freely to and from Portuguese East Africa. The presence of swarms has, however, been reported as far west as the Wankie

(1) Communication from Mr. JULIO GARDÉ ALFARO CARDOSO, Chief of the Entomological Section, Lourenço Marques, transmitted to the Institute by the Director of the Agricultural Services of the Colony.

(2) Communication from the official correspondent of the Institute, Mr. RUPERT W. JACK, F. E. S., Chief Entomologist, Department of Agriculture, Salisbury, Southern Rhodesia.

district, and as far south as Chibi and Insiza districts, all of which are in distinctly or comparatively dry areas. Salisbury township has suffered several visitations during the month.

To the end of the month there was no sign of development of the ovaries in the females.

Enemies and Disease:

Nothing has been recorded under this heading. All specimens examined during the month have been healthy and free from both parasites and disease.

Damage:

Damage to native trees, plantations of exotic trees, fruit trees, early grazing and irrigated crops has been reported from various districts.

Outlook:

The prospect for the coming season in regard to prevalence of hoppers based on prevalence of winged locusts in the colony and reports from neighbouring territories, has become decidedly grave, and it appears highly doubtful if the peak of the present swarm cycle of the Red Locust has as yet been passed, even in Southern Rhodesia.

VARIOUS QUESTIONS

Resolutions of the Third International Locust Conference*.

II. — THE SPECIAL PROBLEMS OF EACH SPECIES OF LOCUST AND THE STEPS TO BE TAKEN FOR THEIR FURTHER INVESTIGATION.

(a) The Tropical Migratory Locust, *Locusta migratoria migratorioides* (Reiche and Fairmaire).

The problem of the outbreak centres of the Tropical Migratory Locust in the French Soudan has reached the stage of systematic research in the field, at specified points and by local observers.

The Conference, considering that the work of field investigators whose principal function is to determine the outbreak centres should after their departure be carried on by staffs of observers whose duty it should be to apply and develop the methods laid down by the field investigators and to enlarge at a later stage the existing nucleus of organisations responsible for preventing the formation of migratory swarms, hopes that the co-operating Governments will select from their agricultural staffs observers for service in each region in which it seems necessary who shall act under the instructions of the principal field officers.

(*Note. — These are enumerated in Resolution III (a) (i) below*).

* Concluded from this *Bulletin*, 1934, No. 12, p. 275.

(b) The Desert Locust, *Schistocerca gregaria* (Forskål).

The problem of the Desert Locust is further from solution than that of other locust species. This is due to the fact that there is still very little known regarding its outbreak areas, owing to the wide extent and difficult nature of the countries in which they are suspected to be located.

It is, therefore, urgently necessary that the Governments concerned should arrange for at least preliminary surveys to be undertaken of the regions suspected of being outbreak areas.

(*Note. — These are enumerated in Resolution III (a) (ii) below*).

(c) The Red Locust, *Nomadacris septemfasciata* (Serville).

(1) To assist in the delimitation of the outbreak areas and outbreak centres of the Red Locust, it is desirable that all African territories south of the Sahara, whether known to be liable to invasion by this species or not, should prepare vegetation maps to show the distribution and nature of open and very thinly bushed grasslands. Copies of these should be sent to the international centre for anti-locust research (the Imperial Institute of Entomology, London), either direct or through their own national anti-locust organisations or through the Southern African Locust Bureau. Such maps will be greatly increased in value if photographs and notes on the vegetation can be added.

(2) In all countries general observations should be made on the changes in distribution of isolated locusts during the later stage of the swarm outbreak.

(3) In addition to the laboratory work already carried out in various places to solve the problems set by field work on the Red Locust, at least one extra whole-time laboratory worker with adequate facilities is needed. This worker should keep in the closest possible touch with the field workers and should work on the problems which they find most urgent but are unable to investigate themselves; he should therefore work in the southern half of Africa. Rhodesia, the Union of South Africa and Mozambique appear to be the most suitable countries for such studies.

(4) Entomological reconnaissance is still needed in certain areas.

(*Note. — These are enumerated in Resolution III (a) (iii) below*).

(d) The Moroccan Locust, *Dociostaurus maroccanus* (Thunberg).

In view of the very promising results obtained in several Mediterranean countries in biological studies on the Moroccan Locust, it is highly desirable that such studies should be continued by the Governments concerned and initiated by the Governments of other countries suffering from the ravages of this locust.

III. — Arrangements for further international co-operation in anti-locust research.

(a) Allocation for each species of locust of the areas to be investigated.

(i) The Tropical Migratory Locust, *Locusta migratoria migratorioides* (Reiche and Fairmaire).

The regions of the Middle Niger (zone of inundation and South Sahelien zone) are of international interest. They should be regarded as the principal objective for research on the outbreak centres of the Tropical Migratory Locust. The biological study of this species already begun by the French authorities, should be pursued in the Middle Niger preferably for the moment, as this is at present believed to be the only outbreak area of this species.

(ii) The Desert Locust, *Schistocerca gregaria* (Forskål).

The main areas where further investigations are required are shown in the following list [see p. 11] in which are indicated also those areas already investigated:—

(iii) The Red Locust, *Nomadacris septemfasciata* (Serville).

(1) A primary reconnaissance would be of value in the Belgian Congo, where the Lualaba Valley should be regarded as a probable outbreak centre.

(2) It is desirable that:—

(*a*) work on the grasslands of Mozambique should be undertaken by the Portuguese and Union of South Africa Governements;

(*b*) the Government of Nyasaland should initiate work on Lake Shirwa and Zomba Mountain and this work should be correlated with the work in progress in the Lower Shire in Portuguese East Africa;

(*c*) the Government of Northern Rhodesia should arrange to watch the Kafue Flats at Mazabuka;

(*d*) the Government of the Union of South Africa should arrange for the study of the Red Locust in the eastern grasslands of the Union.

(3) A primary reconnaissance in Oubangi-Shari, in the southern parts of the Anglo-Egyptian Sudan and in Uganda before these areas are overrun by swarms would assist in the discovery of the essential features of outbreak centres.

(4) It is desirable that investigations of the swarming phase (phase *gregaria*) should be undertaken by the Portuguese Government in the Mossamedes and Huila districts of Southern Angola and in the Kwango district of Northern Angola.

(5) The authorities in the Belgian Congo should investigate the Belgian sector of the Kwango region.

(6) It is desirable that the grasslands of the Mweru-Tanganyika lowlands of Northern Rhodesia should be mapped.

(7) The southern shores of Lake Chad must be regarded as a potential outbreak centre of the Red Locust. At the moment, there is hardly any evidence

Regions and area.	Type or investigation required.	Countries by which work should be undertaken.
A. – *Moroccan–Senegambian region*—		
i. Mauritania	Reconnaissance.	France.
ii. Rio de Oro	Reconnaissance.	Spain.
iii. Draa Valley	Reconnaissance.	France.
B. – *Algerian–Nigerian region*—		
i. Nema area	(Already investigated).	
ii. Adrar des Iforas	(Already investigated).	
iii. Area north and north-east of lake Chad	Reconnaissance.	France.
iv. Southern part of the Niger Colony ("Tegama")	Reconnaissance.	France.
C. – *Sudanese–Arabian region*—		
i. Kordofan	(Already investigated).	
ii. Darfur	Reconnaissance in progress.	Great Britain.
iii. African coast of the Red Sea:		
(*a*) Sudan Coast	Stationary work.	Great Britain.
(*b*) Coast of Eritrea	Reconnaissance.	Italy.
(*c*) Abyssinia	Reconnaissance.	Abyssinia.
iv. Arabia:		
(*a*) Coastal plains of Yemen	Reconnaissance.	Yemen.
(*b*) Nefud	Reconnaissance.	Saudi Arabia.
(*c*) Batina plain	Reconnaissance.	Oman
(*d*) Lahej	Reconnaissance.	Great Britain.
D. – *Somali region*—		
Italian Somaliland	Reconnaissance.	Italy.
E. – *Indian region*	Stationary and reconnaissance work in progress.	India.
F. – *South West African region*	Detailed survey.	Union of South Africa.

available regarding the distribution of this locust in those parts of the shore lying in French territory to the east of Nigeria. It is desirable that this area should be examined. It is recommended that the British and French authorities should collaborate in this matter.

(iv) Other species of locust.

In view of the fact that the biological study of local species of migratory locusts of secondary importance may provide valuable information and serve to enlarge the means of control available against the principal migratory species, the Conference hopes that side by side with the programme of research already drawn up at this Conference, investigations should be carried out in regard to the secondary species such as *Tylotropidius* sp., *Acrotylus* sp., etc.

(b) Improvements on the present system of reporting on locusts.

(1) It is a matter of great satisfaction to the Conference that the recommendations made by the First and Second International Locust Conferences, held respectively in Rome and Paris [see this *Bulletin*, 1932, No. 1, pp. 6-10; 1933, No. 1, pp. 5-9]. in regard to the preparation in every territory of reports on locust activities have met with the ready support of the majority of the authorities concerned.

It is particularly important that these efforts should not be relaxed when there is a reduction in the intensity of locust invasions, since exact data on the last stages of the invasions would throw important light on their origin.

(2) It is, however, to be regretted that in some of the territories subject to locust invasions there are still no organisations for the regular collection of information on locusts. While the Conference realise the administrative difficulties often involved, they hope that effective steps will be taken by the Governments concerned to establish such organisations wherever possible.

(3) International locust investigations would, the Conference further point out, be greatly assisted if there were greater uniformity in the preparation of the locust reports and if these were forwarded to the international centre (Imperial Institute of Entomology, London), with greater regularity. To this end, the action recommended by the Second International Locust Conference should be supplemented as follows:—

(*a*) Reports should be prepared for monthly (or shorter) periods and copies sent direct to the international centre as soon as practicable.

(*b*) All reports should be accompanied by sketch maps marked with the conventional signs approved by previous conferences as modified below.

Conventional Signs for the recording on maps of data regarding the migrations, egg-laying, and emergence of locusts.

- a swarm flying in a known direction.
- a flying swarm, direction not known.
- a settled swarm.
- a settled swarm departing in a known direction.
- a settled swarm which came from a known direction.
- a circling swarm.
- an ovipositing swarm.
- egg deposits.
- hoppers.
- S adults in the solitary phase.

(*The date should be written beside the sign*).

Records of adult locusts (but not hoppers) should be made with the following colours:—

Red – young swarms.
Blue – swarms ready to oviposit or ovipositing.
Black – swarms of intermediate maturity or of which the maturity is unknown.

(*c*) Great care should be taken to differentiate between the various species of locust observed. Separate reports and maps should be prepared for each species. Undertermined species should be reported on separately.

(*d*) Monthly reports should include a brief summary of the situation during the month. Special attention should be paid to the first and last dates of the appearance of (i) eggs, (ii) hoppers, and (iii) adults. When swarms of two successive generations are observed, the data in regard to them should be discriminated in the reports and maps. Distinct colours should be used to indicate different generations.

(*e*) Where only reports for periods longer than one month (three monthly, annual) are prepared by local administrations, it is particularly important that copies should be forwarded direct to the international centre at the earliest possible date and where possible by air- mail.

(*f*) In periods of locust invasion it is desirable that warning notices of local breeding and of probable swarm movements should be communicated by administrative authorities to the corresponding authorities of adjoining territories.

(c) The exchange of reports between field investigators.

(1) In the interests of a closer co-operation in anti-locust research it should be desirable that the Governments of locust-infested countries should arrange for the communication as expeditiously as possible by the responsible departments of reports relating to the locust problem to the international centre for anti-locust research (Imperial Institute of Entomology, London).

(2) It is desirable that Governments should instruct their officers receiving such reports to treat them as strictly confidential until their publication by the respective authors.

(3) It is further desirable that Governments should authorise the communication of such reports to government entomologists engaged in anti-locust work in neighbouring territoiries, either direct or through the international centre.

(d) Definition of the terms relating to the distribution and migration of locusts.

In view of the great diversity which at present exists in the use of the terms relating to the distribution and migration of locusts, it is desirable that the following terms should be used in all reports in the sense indicated below:—

(1) *Distribution area of species.*

All the territories where the solitary phase (phase *solitaria*) of a species lives permanently.

(2) *Invasion area of a species.*

All the territories which can be invaded by a species in its swarming phase (phase *gregaria*).

(*a*) *The area of normal migration.*

All the territories normally visited by a species in its swarming phase (phase *gregaria*), and in which it can breed.

(*b*) *The area of occasional migration.*

All the territories to which a species in its swarming phase (phase *gregaria*) migrates only occasionally, but in which it can breed.

(*c*) *The area of exceptional invasions.*

All the territories which can be invaded in exceptional cases by a species in its swarming phase (phase *gregaria*), but in which it does not breed.

(3) *Outbreak area.*

All the centres of outbreaks.

(4) *Outbreak centre.*

A station the ecological conditions of which sometimes provoke the transformation of a species into its swarming phase (phase *gregaria*).

(e) Standardisation of biometric methods.

In view of the diversity which at present exists in the methods of measuring locusts and in the expression of these measurements it is desirable that all workers in this field should adopt uniform methods.

(1) *Methods of measuring.*

It is desirable that all workers should follow the methods of Zolotarevsky given in his " Contribution à l'étude biologique du criquet migrateur, *Locusta migratoria capito* (Saussure) dans ses foyers permanents " (*Annales des Epiphytics*, Paris, 1933, 19e année, nos 1 et 2), employing the following symbols:—

E length of elytron.
F length of femur.
P length of pronotum.
M width of constriction of pronotum (width of middle).
H height of pronotum.
C maximum width of head.

(2) *Methods of expressing ratios.*

It is desirable that the various ratios should always be expressed in the same way and that the following should be adopted:—

E/F ratio of elytron to femur.
P/C ratio of pronotum to maximum width of head.
H/C ratio of height of pronotum to maximum width of head.
M/C ratio of width of constriction of pronotum to maximum width of head.

(3) *Methods of calculating averages.*

The true average ratio is obtained by calculating the ratio of the totals of the actual measurements and not the average of the individual ratios.

LEGISLATIVE AND ADMINISTRATIVE MEASURES

Germany (Anhalt). — By Police Ordinance, dated 6 October, 1934, measures have been adopted for the control of public establishments of seed disinfection. These measures correspond exactly to those adopte in the province of Saxony [see this *Bulletin*, 1934, No. 11, p. 248]. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. November 1934, Bd. VI, Nr. 7, S. 124).

Germany (Lippe). — By Police Ordinance of 22 September, 1934 the control of hamsters and voles is made compulsory. The official agricultural organisation is authorised to buy what is necessary for the control in common in a given district and to divide the expenses among the communes interested which, in their turn, will be re-imbursed by the land owners. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. November 1934, Bd. VI, Nr. 7, S. 125-126).

Argentine Republic. — On account of the great amount of damage caused by the ivy red spider (*Bryobia praetiosa* Koch), chiefly in the orchards in the valley of Río Negro and Provinces of Cuyo, this mite, commonly called ' Arañuela parda ', ' Arañita parda ' or ' Bryobia ', is declared to be an agricultural pest by Presidential Decree No. 34.079-32, dated 5 January, 1934. (*Boletín Oficial de la República Argentina*, Buenos Aires, 31 de enero de 1934, año XLII, núm. 11.897, pág. 1100).

*** The Ministerial Resolution No. 62 of 18 January, 1934 terminates the functioning of the Commission for organising the competition of apparatus for the control of the hoppers of the South American locust [*Schistocerca paranensis*] and approves the decisions made by that Commission. (*Ibid.*, 16 de febrero de 1934, núm. 11.909, págs. 511 y 512).

*** The Presidential Decree No. 34.751-97 of 19 January, 1934 establishes the conditions under which the transport of potatoes will be permitted in the territory of the Federal capital. (*Ibid.*, núm. 11.909, págs. 488 y 489).

*** The Ministerial Resolution No. 67 of 23 January, 1934 charges the Direction of the ' Defensa Agrícola y Sanidad Vegetal ' with the execution of the Presidential Decree No. 32.962, dated 21 December, 1933, relating to the exportation of fresh fruits.

The same Resolution defines, *inter alia*, the signification of the following terms:—

' Virtually free from insects and cryptogamic diseases ', ' Damage of physical origin ', ' Damage of mechanical origin '.

A scale for establishing the sanitary condition of fruits is also adopted. (*Ibid.*, 1º de febrero de 1934, núm. 11.898, págs. 25 y 26).

*** The Ministerial Resolution No. 117 of 16 February, 1934 establishes that railway companies, shipping companies or private persons may only accept for transport to the Southern zones of Bahía Blanca and the territories of Río Negro and Neuquén, consignments of fruits and vegetables packed in completely new cases of the type known as ' envase perdido '. (*Ibid.*, 6 de marzo de 1934, núm. 11.924, pág. 155).

*** The Presidential Decree No. 37.383-314 of 28 February, 1934, confirms the authorisation given to the Ministry of Agriculture, by ' Acuerdo de Ministros ' No. 1089, to purchase a vacuum chamber for fumigation belonging to the Direction of the ' Defensa Agrícola y Sanidad Vegetal ' and which will be installed at Mendoza. (*Ibid.*, 23 de marzo de 1934, núm. 11.938, pág. 900).

*** The Presidential Decree No. 37.843-351 of 7 March, 1934 authorises the Direction of the ' Defensa Agrícola y Sanidad Vegetal ' to engage temporarily the personnel for the control of the South American locust [*Schist. paranensis*]. (*Ibid.*, 6 de abril de 1934, núm. 11.947, pág. 277).

*** By Ministerial Resolution No. 513 of 3 August, 1934 a Commission has been formed for studying a plan of control of Aleppo grass [*Sorghum halepense*]. (*Ibid.*, 16 de octubre de 1934, núm. 12.102, pág. 565).

Canada. — A Circular of the Destructive Insect and Pest Act Advisory Board, dated 17 October, 1934, announces that it has been decided to exempt mushroom spawn from the requirements of Regulation No. 1 (Foreign) of the Destructive Insect and Pest Act. Therefore, no permit will be required to cover importations of this commodity, neither will such importations be subject to inspection on arrival in Canada, nor are they required to be accompanied by a certificate of inspection issued in the country of origin. (Canada. Department of Agriculture. Destructive Insect & Pest Act Advisory Board. *Circular to Importers of Mushroom Spawn.* Ottawa, October 17, 1934, 1 p. [mimeographed]).

Spain. — By ' Orden ' of 16 November, 1934, conditions are laid down with regard to the examination of the lands declared to contain locust eggs. (*Gaceta de Madrid*, Madrid, 21 noviembre 1934, año CCLXXIII, tomo IV, núm. 325, págs. 1436 y 1437).

Palestine (1). — By the Plant Protection Order (No. 3), 1934, dated 6th September, 1934, the Plant Protection Order (No. 2), 1934 [see this *Bulletin*, 1934, No. 10, pp. 226-227], shall be amended:—

(*a*) by the substitution in the place of the words ' All species of *Citrus* other than citrus fruits from Egypt and Cyprus ' appearing in schedule I thereof of the words ' All species of *Citrus* other than citrus fruits from Egypt, Cyprus and Syria ', and

(1) From documents communicated to the Institute by the Director of Agriculture and Forests, Jerusalem, Palestine.

(*b*) by the deletion of the words ' All species of *Prunus*, *Pyrus* and *Crataegus* ' appearing in schedule I thereof, and

(*c*) by the substitution in the place of the words ' Citrus fruit from Egypt and Cyprus ' appearing in schedule II thereof of the words ' Citrus fruit from Egypt, Cyprus and Syria ', and

(*d*) by the substitution in the place of the words ' Apples and pears, whether nursery stock or fruit from the U. S. A., Canada, Australia or Hungary ' appearing in schedule II thereof of the words ' Apples and pears, whether nursery stock or fruit from the U. S. A., Canada, Australia, Hungary or Rumania ', and

(*e*) by the addition after the words ' All species of *Trypetidae* ' appearing in schedule II thereof of the words ' *Cryptorrhynchus gravis* and *C. mangiferae* '.

*** By the Plant Protection Regulations, 1933-1934, dated 14th September, 1934, regulation 3 of the Plant Protection Regulations, 1933 shall be amended by the substitution in the place of the expression ' (seeds excepted) ' therein appearing of the expression:— ' (dried or conserved fruits and seeds excepted) '.

Rumania (1). — The Ministerial Decision No. 220659 of 3 November, 1934 establishes the following measures:—

Art. 1. — With a view to preventing the introduction into Rumania of San José scale (*Aspidiotus perniciosus* Comst.) from countries infested with this pest, it is forbidden to import fruit trees and bushes, ornamental plants, vines, stocks, cuttings, vine-shoots, roots of fruit trees and bushes, unless:—

(a) they come from an orchard, garden or nursery not infested with San José scale and if in a radius of 5 km. of the locality or in the neighbourhood of the locality of their origin the presence of San José scale has not been ascertained;

(b) they have been disinfected on leaving the orchard, garden or nursery by fumigation with hydrocyanic acid;

(c) they are accompanied by a phytosanitary certificate delivered by the competent authorities in which it is specially stated that the necessary conditions mentioned in (a) and (b) have been complied with.

Art. 2. — Countries considered infested are:— North and South America, North and South Africa, Australia, China, Japan, India, Mesopotamia, Asia Minor, Hungary, Austria, Jugoslavia, Spain and Portugal.

Art. 3. — The transit of the plants and parts of plants mentioned in article 1, coming from infested countries, is only authorised through wagons, closed and sealed, accompanied by a phytosanitary certificate complying with the conditions contained in article 1.

Phytosanitary certificates delivered more than 10 days before the day of expedition will not be accepted.

Art. 4. — Plants and parts of plants mentioned in article 1, coming from non-infested countries are admitted if they are accompanied by a phytosanitary

(1) Communication from the Director of Viticultural and Horticultural Services, Ministry of Agriculture and Lands, Bucarest, to the International Institute of Agriculture.

certificate delivered by recognised authorities and complying with the specifications mentioned in article 1 (a).

Art. 5. — Fresh flowers, bulbs and tubers of flowers are admitted without special permission on payment of legal taxes if they are accompanied by a phytosanitary certificate delivered by recognised authorities.

Art. 6. — The present Decision annuls the Decision No. 77957 of 23 March, 1925.

Senegal. — The Decree No. 1759 of 17 July, 1934, establishes certain measures for the protection of ground nuts against the attack of ' bruches ' [*Pachymerus acaciae*]. In particular it is forbidden, from 1 November of each year, except in the ports of embarkation, to sell for exportation or to bring to the ' seccos ' of the Insurance Societies, seeds from the harvest of the previous year.

From the same date, all ' seccos ', warehouses and localities (except in the ports) intended for the reception of ground nuts, should be completely emptied of all seeds and disinfected. In addition the surroundings of these places should be cleaned within a radius of 25 metres.

The use of light traps is compulsory in all ' seccos ', warehouses or localities intended for the storage of any quantity of seeds and the insects which are caught during the night should be destroyed. (*Journal Officiel du Sénégal*, Saint-Louis, 20 septembre 1934, soixante-dix-neuvième année, nº 1773, p. 738-739).

Uruguay. — By Presidential Decree, dated 17 July, 1933 the American ostrich [*Rhea americana*] is declared to be useful to agriculture in that it destroys injurious insects and for this reason the hunting of this bird is forbidden. At the same time the exportation of American ostriches in any form whatever is also forbidden. (*Ministerio de Industrias. Dirección de Agronomía. Publicación Mensual*, Montevideo, julio de 1934, año VII, nº. 2, págs. 51 y 52).

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[In addition to the proceedings of the Conference printed in both French and English this volume contains the following appendices:—

(1) Outbreak areas and factors inducing transformation of the solitary phase of migratory locusts into the swarming phase, by B. N. Zolotarevsky. (In French only).

(2) The life cycle, particularly sexual maturation, in relation to climatic and other factors; and methods of study, by Rao Sahib Y. Ramachandra Rao.

(3) Migration and the factors inducing it with regard to all phases, and methods of their study, with special reference to the type of meteorological maps likely to be of assistance, by A. P. G. Michelmore.

(4) Methods of field survey in locust research, by F. D. Golding.

(5) Ecology and habits of locusts in an invasion area (Uganda) with special reference to *Locusta migratoria migratorioides* (Reiche and Fairmaire) ph. *transiens*, by H. B. Johnston.

(6) Locust diseases, by J. C. F. Hopkins.

(7) Fundamental research on the locust problem, by B. P. Uvarov.

(8) The destruction of locusts in flight by mean of a poison dust (sodium arsenite) delivered from aircraft, by H. H. King. This report is accompanied by two sub-appendices, also in English, reporting the observations of W. Allan and J. K. Chorley on the same subjet.

(9) The use of aeroplanes in locust control, by T. Naudé.

(10) Further investigations on the Desert Locust, *Schistocerca gregaria* (Forskål), by the United Kingdom delegation.

(11) Summary of results and programme of further investigations on the Red Locust, *Nomadacris septemfasciata* (Serville), by A. P. G. Michelmore.

(12) Research carried out under the auspices of the Italian Government on *Dociostaurus maroccanus* (Thunberg) and on *Calliptamus italicus* (Linn.), by Filippo Silvestri.

(13) The organisation for the collection of information on locusts in the Union of South Africa, by Jacobus C. Faure.

(14) Summary of locust research work carried on in north-west India under the auspices of the Imperial Council of Agricultural Research, Simla, by Rao Sahib Y. Ramachandra Rao.

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(18) The swarming of *Schistocerca gregaria* (Forskål) in the Union of South Africa and in South West Africa in 1934, by Jacobus C. Faure.

(19) Declarations and resolutions submitted by the Belgian delegation. (In French only).

(20) Locusts in Southern Rhodesia, by Rupert W. Jack.

(21) Locust research in Egypt, by A. M. Mistikawi.

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[*Zonocerus variegatus*, *Lecanium viride*, *L. coffeae*, *Pseudococcus citri*, *Monohammus sierricola*, *Apate monachus*, *Stephanoderes coffeae* on coffee; *Sahlbergella singularis*, *Helopeltis* sp., *Mallodon downesi*, *A. monachus*, *Eulophonotus myrmeleon*, on cacao; *Phosphorus jansoni* and *Balanogastris kolae* on colas; *Rhynchophorus phoenicis*, *Plutygenia barbata* and *Oryctes* sp. on oil palms; *Oryctes* sp. and *Aspidiotus destructor* on coconuts; *Limacodidae* on bananas; *Sesamia vuteria* and *Calandra oryzae* on maize; *Fomes lignosus*, *Ganoderma* sp., *Trachysphaera fructigena*, *Marasmius scandens*, *Corticium koleroga* on coffee; *F. lignosus*, *Lasiodiplodia theobromae*, *Amillariella mellea*, *Phytophthora palmivora*, *Marasmius equicrinis*, *M. scandens*, *Trach. fructigena* on cacao; *M. equicrinis* on colas; *Pestalozzia palmarum* on coconuts; *M. stenophyllus* on bananas; mosaic on manihot; mosaic, *Corticium rolfsii* and *Cercospora personata* on ground nuts; *Ustilago maydis*, *Helminthosporium turcicum* and *Diplodia zeae* on maize; *F. lignosus* on rubber trees. All these observations apply to the year 1933].

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[*Sphrigodes globulus* n. sp. on ground nuts and sesamum; *Sphr. crinitus* n. sp. on sesamum; *Isaniris centropus* n. sp. on coffee; *Systates alticollis* n. sp. on ground

nuts; *Syst. annulatus* n. sp. on tea; *Syst. minimus* n. sp. on French beans; *Goniorrhinus terrenus* n. sp. on cotton. Description in English].

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[*Hemileia coffeicola* n. sp., observed on the leaves of *Coffea arabica*; this new species has already been described under the provisional name of *Uredo coffeicola* (see this *Bulletin*, 1934, No. 5, p. 116). The authors add that *U. gardeniae-thunbergiae* P. Henn. should also been included in the genus *Hemileia* under the name of *H. gardeniae-thunbergiae* (P. Henn.) Maubl. and Roger].

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[*Gibberella saubinetii*, *Diplodia zeæ*, *Fusarium moniliforme*, *Penicillium* sp., *Rhizopus* sp., *Aspergillus* sp.].

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[*Geomyza balachowskyi* n. sp. injurious to *Holcus* spp.; *Opomyza petrei* n. sp. injurious to *Anthoxanthum* spp. Description in French].

MESNIL, L. Note préliminaire sur un nouveau parasite des céréales, Phytophaga Mimeuri, n. sp. *Bulletin de la Société Entomologique de France*, Paris, 1934, tome XXXIX, n. 17, p. 245-247. Bibliographie, p. 247.
[Injurious to wheat and to barley and rye in North Africa (Algeria and Morocco). Description in French].

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[*Rhagoletis cerasi*].

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Phytophthora omnivora, Phacidiella discolor, Nectria galligena, Alternaria sp., *Cladosporium herbarum, Trichothecium roseum*. Non-parasitic diseases:— ' Rindenbräune ' or Scald, ' Frostflecken ' or Soft Scald ', and several ' Fruchtfleischbräune '].

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[See this *Bulletin*, 1934, No. 12, p. 288].

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[*Platyedra gossypiella, Earias biplaga, E. insulana, Diparopsis castanea, Chloridea obsoleta, Prodenia litura, Syagrus rugiceps, Microtermes* spp., *Dysdercus cardinalis, Oxycarenus hyalinipennis, Nezara viridula, N. viridula* varr. *torquata* and *smaragdula, Acrosternum pallidoconspersum, A. acutum, Spilostethus pandurus, Graptostethus furcatus, Leptocoris griseiventris, Empoasca dolichi, E. benedettoi, E. facialis, Erythroneura lubicæ, Aphis gossypii, Dendrothrips russoi, Scirtothrips aurantii, Tæniothrips sjöstedti, Frankliniella dampfi, Bemisia gossyperda, Uredo gossypii, Ramularia areola, Bacterium malvacearum*].

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[*Cuscuta europaea* ?].

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[*Clinodiplosis oleisuga*].

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[A virus disease].

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[*Ustilago hordei* on *Hordeum vulgare*; *U. tritici* on *Triticum vulgare*; *Urocystis tritici* on *T. vulgare*; *Sphacelotheca sorghi* on *Andropogon sorghum* (= *Sorghum vulgare*); *Sph. reiliana* on *S. vulgare*].

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